IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application No.	:	10/673,111	Confirmation No. 2316
Applicants	:	Kentaro TOYAMA et al.	
Filed	:	September 26, 2003	
Title	:	SYSTEM AND METHOD FOR EMPLOYING A GRID INDEX FOR LOCATION AND PRECISION ENCODING	
TC/AU	:	2162	
Examiner	:	Giovanna B. Colan	
Docket No.	:	81190-0007	
Customer No.	:	29693	

MAIL STOP APPEAL BRIEF – PATENTS
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPELLANTS' BRIEF ON APPEAL UNDER 37 C.F.R. § 41.37

Sir:

This is an appeal from the final Office action dated October 6, 2006. A Notice of Appeal was timely filed on April 6, 2007.

I. REAL PARTY IN INTEREST

The Real Party in Interest in this appeal is PlanetEye Company ULC, the assignee of record.

II. RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences known to Appellants, Appellants' representatives, or the assignee that will directly affect, be directly affected by, or have a bearing on the Board's decision in the pending appeal.

III. STATUS OF THE CLAIMS

Claims 1-22 and 26-30 are pending in the application. All pending claims stand rejected and are appealed. Of the appealed claims, claims 1 and 26 are independent. Claims 2-22 depend from claim 1, and claims 27-30 depend from claim 26.

The Claims Appendix includes a listing of the claims involved in the appeal as they presently stand.

IV. STATUS OF THE AMENDMENTS

No amendment has been submitted after the October 6, 2006 final Office action. Applicants' Response Under 37 C.F.R. § 1.116, dated April 6, 2007, contained remarks only.

All previously-submitted amendments have been entered.

V. SUMMARY OF THE CLAIMED SUBJECT MATTER

The instant application relates to a system and method for combining the precision estimate of a database entry's coordinate value and the coordinate value into a single index. In particular, the instant application relates to a system and method for creating an index that represents a database entry as a one-dimensional series (that is, an array as opposed to a matrix) of grids incorporating the location of the database entry. The claimed invention is described, *inter alia*, at paragraphs [0043] through [0067] of the application as published, and is illustrated in Figs. 2 through 6.

In particular, claim 1 recites a method that includes inputting one or more location entities. *E.g.*, Fig. 2, block 202. A one-dimensional grid index series, wherein each location entity is represented as a series of grids that incorporate the location of each location entity, is computed. *E.g.*, Fig. 2, block 204. The grid index series may then be output to a database. *E.g.*, Fig. 2, block 206.

Claim 10, which depends from claim 1, additionally recites that the longitudinal span in degrees that 3σ meters corresponds to is given by the equation

$d = \frac{[180(3\sigma)\cos(\text{latitude})]}{k\pi}$, where *k* is the circumference of Earth in meters. Specification, para. [0055].

Claim 11, which depends from claim 1, additionally recites that the step of determining the degree-scale of precision, *R*, to be the discrete unit of resolution just larger than *D* is carried out by applying the equation $r = \left|-\log_2 d/_{20}\right|$. *Id.*

Claim 19 depends from claim 1 and further recites that the location entity's coordinates in latitude (lat) and longitude (long) is mapped to the index by applying the equation $l = \left(\frac{360}{r}\right)\left[\frac{lat+90}{r}\right] + \left[\frac{long+180}{r}\right]$, where *r* is the degree-scale of precision. *Id.*, Equation (1).

Claim 20 depends from claim 1 and further recites that the following equations are used to recover latitude and longitude values:

$lat = \frac{lr^2}{360} - 90 + \frac{r}{2}$; and

$long = l\% \frac{r^2}{360} - 180 + \frac{r}{2}$, where *r* is the degree-scale of precision, *l* maps the coordinates to the location entity, and % is the modulus operator. *Id.*, Equation (2).

Claim 26 recites a computer readable medium having computer-executable instructions for combining a precision estimate of a database entry's coordinate value with the coordinate value into a single index. The instructions include inputting one or more location entities. *E.g.*, Fig. 2, block 202. A one-dimensional grid index series, wherein each location entity is represented as a series of grids that incorporate the location of each location entity, is computed. *E.g.*, Fig. 2, block 204. The grid index series may then be used to query the location entities such that any query that seeks a match of a location entity at a small grid size does not seek a match of a location entity at a larger grid size. *E.g.*, Fig. 5.

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

A. Whether claims 1-6, 14-18, 21, 22, 26, 27, 29, and 30 are obvious over United States patent no. 6,370,476 to McBride ("McBride") in view of United States patent no. 5,647,058 to Agrawal et al. ("Agrawal").

B. Whether claims 7, 8, and 28 are obvious over McBride in view of Agrawal and United States patent no. 6,603,885 to Enomoto ("Enomoto").

C. Whether claims 9-13 are obvious over McBride in view of Agrawal, Enomoto, and United States patent no. 6,333,924 to Porcelli et al. ("Porcelli").

D. Whether claims 19 and 20 are obvious over McBride in view of Agrawal, Enomoto, and European patent application EP 838 764 A2 to Na ("Na").

VII. ARGUMENT

A. The claimed invention is substantially different from the combination of McBride and Agrawal, and therefore the claimed invention is not obvious.

The Examiner rejects claims 1-6, 14-18, 21, 22, 26, 27, 29, and 30 under 35 U.S.C. § 103 as obvious over McBride in view of Agrawal. For purposes of this appeal, claims 1-6, 14-19, 21, and 22 stand or fall together and claims 26, 27, 29, and 30 stand or fall together.

Though the prior art references need not teach or suggest each and every claim limitation, the Examiner must explicitly state why the differences between the prior art and the claimed invention would have been obvious to one of ordinary skill in the art at the time the invention was made. Examination Guidelines for Determining Obviousness Under 35 U.S.C. § 103 in View of the Supreme Court Decision in *KSR International Co. v. Teleflex Inc.*, 72 Fed. Reg. 57526, 57528 (Oct. 10, 2007). Appellants contend that the gap between the rejected claims and the references cited is sufficiently great so as to render the claimed invention non-obvious. In particular, Appellants contend that, though the cited references use the term "index," the term is used in a markedly different sense than in the present application, and thus one of ordinary skill in the art would not have learned the claimed invention from the asserted combination. *Id.* at 57527 ("[T]he focus when making a determination of obviousness should be on what a

person of ordinary skill in the pertinent art would have known at the time of the invention, and *on what such a person would have reasonably expected to have been able to do in view of that knowledge.*") (emphasis added).

Claims 1 and 26 recite "computing a one-dimensional grid index series wherein each location entity is represented as a series of grids that incorporate the location of each location entity[.]" It is well settled that patentees can be their own lexicographers. MPEP § 2111.01(IV). Appellants have done precisely that with the term "one-dimensional grid index series." Briefly, a "one-dimensional grid index series" expresses, as a one-dimensional entity (e.g., a vector rather than a matrix), the indices assigned to the grid squares to which the coordinates for a particular location entity map for each of several grids of varying size overlaid upon a map space. That is, for a location entity *x* in space and a given grid, there is a function *Index(x)* that retrieves a unique integer value identifying the grid square of the given grid that contains location entity *x*. Where multiple grids (for example, multiple grids of varying size) are used, a function *Index(x, s)* retrieves a unique integer value for the grid square within a grid *s* that contains location entity *x*. Specification, para. [0043].

The computation of a "one-dimensional grid index series" according to an embodiment of the present invention is explained in greater detail in the specification. Initially, a map space, such as the region of the globe shown in Fig. 4a, is overlaid (or "gridded") with multiple grids of varying size, as shown in Fig. 4b. Next, the grids are indexed—assigned unique integer identifiers—in raster-scan order, such that every grid square applied to the map space can be identified by two values: grid size (*s*) and grid index. Specification, paras. [0054]-[0055].

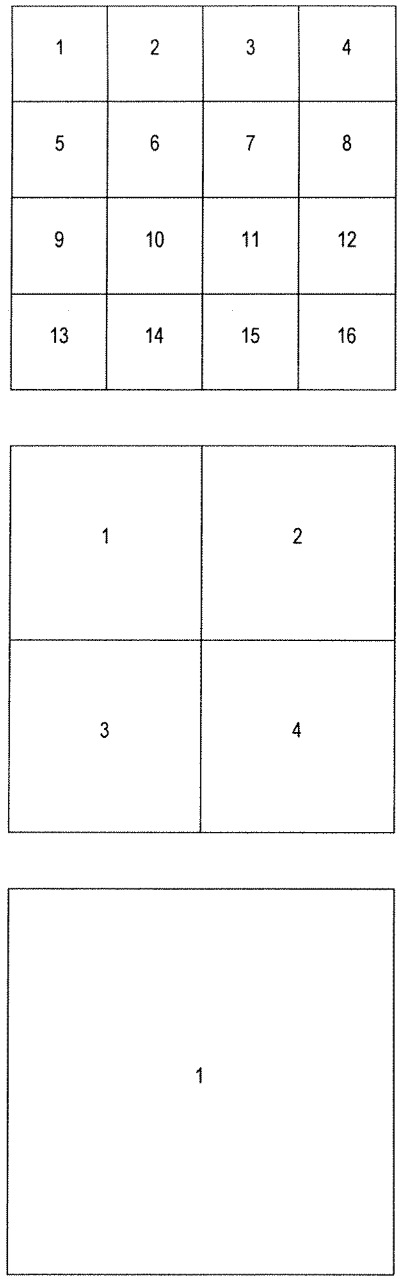
A given location entity *x* has coordinates, such as a latitude and longitude pair, associated therewith. Depending upon the precision with which the coordinates were measured, there may be greater or lesser measurement error associated therewith. Assuming that the measurement error is such that the true location of *x* is normally distributed about the measured coordinates (μ) with a standard deviation σ, it is possible to determine an area within which the location entity *x* is located with 99.8% certainty by creating a range that extends three standard deviations (3σ) to either side of the

coordinates associated with the location entity *x* (e.g., $\mu \pm 3\sigma$). The "degree-scale of precision, *r*" is the smallest size grid square capable of fully encompassing the area so calculated. For grids having grid squares of size $s \geq r$ (that is, those grids having grid squares large enough to fully encompass the 99.8% certainty area for the coordinates of location entity *x*), it is determined to which grid square (e.g., which grid index) the location entity *x* maps. For grids having grid squares of size $s < r$ (that is, those grids having grid squares too small to fully encompass the 99.8% certainty area for the coordinates of location entity *x*), a null value is assigned. Id., para. [0055]. The result is a plurality of grid indices—assigned integer identifiers for grid squares or null values—where the location entity *x* is located for grids of varying size. The "one-dimensional grid index series" for location entity *x* is the string of these indices. Id., para. [0063] and Fig. 6.

As a simple example of a "one-dimensional grid index series" according to the present invention, one can consider a checkerboard. Out of the box, a checkerboard is gridded with a grid of size *s* = *1* into an 8-by-8 grid. Indexed in raster-scan order, this grid looks as follows:

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16
17	18	19	20	21	22	23	24
25	26	27	28	29	30	31	32
33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48
49	50	51	52	53	54	55	56
57	58	59	60	61	62	63	64

By combining squares on the board, however, the same checkerboard can also be gridded with a grid of size *s* = *2* into a 4-by-4 grid, a grid of size *s* = *4* into a 2-by-2 grid, and a grid of size *s* = *8* into a 1-by-1 grid (e.g., the entire board):



Next, consider a given location entity *x*. Suppose that the standard deviation of the measurement of location entity *x* is such that the area within which one can be 99.8% certain *x* is actually located is small enough to fit entirely within a grid square of size *s* = *1* (that is, the precision of the coordinates for location entity *x* is such that it can

be identified to the nearest single square on the checkerboard). Suppose further that the coordinates for location entity *x* map to the grid square having grid index 34 in the grid of size *s* = *1* (that is, Index(*x, 1*) = 34). It follows that location entity *x* will map to the grid square having grid index 9 in the grid of size *s* = *2* (e.g., Index(*x, 2*) = 9), the grid square having grid index 3 in the grid of size *s* = *4* (e.g., Index(*x, 4*) = 3), and the grid square having grid index 1 in the grid of size *s* = *8* (e.g., Index (*x, 8*) = 1). The "one-dimensional grid index series" for location entity *x* may therefore be expressed as [1, 3, 9, 34]—a "series of grids that incorporate the location of each location entity[.]"

McBride does not teach or suggest the claimed "one-dimensional grid index series" as explained above. McBride teaches that one may perform a survey, thereby generating a number of "survey location coordinates" measured in a first coordinate system C1. McBride, col. 3, lines 23-46. The survey location coordinates themselves are then used to impose a grid upon the survey region. Id., col. 3, lines 57-60 and Fig. 3. Unlike the claimed invention, this grid need not be regularized and exists only in the context of the visited survey location coordinates—without the survey location coordinates, the survey region remains ungridded.

A survey according to McBride preferably also includes N "survey control points," which are points that have known coordinates both in coordinate system C1 and a second coordinate system C2. Using the "survey control points" as "anchors," it is possible to generate a transform function that expresses locations measured in coordinate system C1 in coordinate system C2. That is, the transform function registers coordinate system C1 to coordinate system C2. Id., col. 3, lines 47-56. McBride utilizes a "grid point index" to identify grid points during calculation of the transform function.

As should be clear from the foregoing discussion, McBride's "grid point index" is substantially different from—in fact, wholly unrelated to—the claimed "one-dimensional grid index series." Though a similar term has been used, McBride's "grid point index" is clearly different from the claimed "grid index series." The *only* commonality appears to be the use of the term "index" to connote a unique integer identifier for something, but this "something" differs markedly between the claimed invention and McBride. For example, whereas the claimed "grid index series" identifies the *grid squares* to which a

location entity is *mapped* for grids of *varying size*, McBride's "grid point index" identifies the *single point* to which a location entity *directly corresponds* on a *single grid*.

Agrawal does nothing to cure the shortcomings of McBride discussed at length above. Accordingly, Appellants submit that the claimed invention is substantially different from, and therefore non-obvious over, the asserted combination of references. The remaining dependent claims are allowable for at least the same reasons as the independent claims from which they depend are allowable.

For at least the foregoing reasons, the rejection of claims 1-6, 14-18, 21, 22, 26, 27, 29, and 30 under section 103 is improper, and the Examiner should be reversed.

B. The claimed invention is substantially different from the combination of McBride, Agrawal, and Enomoto, and therefore the claimed invention is not obvious.

The Examiner rejects claims 7, 8, and 28 under 35 U.S.C. § 103 as obvious over McBride in view of Agrawal and in further view of Enomoto. For purposes of this appeal, claims 7 and 8 stand or fall with claim 1, while claim 28 stands or falls with claim 26.

The addition of Enomoto does nothing to cure the shortcomings of the combination of McBride and Agrawal with respect to claims 1 and 26, discussed at length above. Appellants therefore submit that the rejection of claims 7, 8, and 28 is improper for at least the reasons discussed above, and respectfully request that the Examiner be reversed.

C. The claimed invention is substantially different from the combination of McBride, Agrawal, Enomoto, and Porcelli, and therefore the claimed invention is not obvious.

The Examiner rejects claims 9-13 under 35 U.S.C. § 103 as obvious over McBride in view of Agrawal, Enomoto, and Porcelli. For purposes of this appeal, claims 9, 12, and 13 stand or fall with claim 1, while claims 10 and 11 each stand or fall independently.

The addition of Enomoto and Porcelli does not overcome the shortcomings of the combination of McBride and Agrawal with respect to claim 1, discussed at length above. Appellants therefore submit that the rejection of claims 9-13 is improper for at least the reasons discussed above.

Appellants further respectfully point out that, contrary to the Examiner's assertion, Porcelli does not teach or suggest the equations recited in either claim 10 or claim 11, set forth in Section V, above. Each of these claims is non-obvious over the asserted combination of references for this additional and independent reason.

For at least the foregoing reasons, Appellants respectfully request that the rejection of claims 9-13 under 35 U.S.C. § 103 be reversed.

D. The claimed invention is substantially different from the combination of McBride, Agrawal, Enomoto, and Na, and therefore the claimed invention is not obvious.

The Examiner rejects claims 19 and 20 under 35 U.S.C. § 103 as obvious over McBride in view of Agrawal, Enomoto, and Na. For purposes of this appeal, claims 19 and 20 each stand or fall independently.

Claims 19 and 20 depend from claim 1. The addition of Na does not address the shortcomings of McBride and Agrawal with respect to claim 1, discussed at length above.

Further, Na does not teach the equations recited in either claim 19 or claim 20, set forth in Section V, above.

Therefore, the rejection of claims 19 and 20 under 35 U.S.C. § 103 is improper and should be reversed.

VIII. CONCLUSION

For at least the foregoing reasons, it is clear that the claimed invention is non-obvious over the asserted combinations of prior art references. The rejections under 35 U.S.C. § 103 are therefore improper. Appellants respectfully request that the Board of

Patent Appeals and Interferences reverse the Examiner, and indicate the allowability of all pending claims.

Appellants have provided for the maximum five month extension of time herewith. Appellants have also provided for the payment of the fee due with the filing of an appeal brief. Should any additional fees be due with the filing of this Brief, Authorization is hereby granted to charge any additional fees due with the filing of this document to Deposit Account No. 50-1129 with reference to Attorney Docket No. 81190-0007.

Respectfully submitted,

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Date: November 6, 2007

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CLAIMS APPENDIX

1. A computer-implemented process for combining a precision estimate of a database entry's coordinate value with the coordinate value into a single index, comprising the process actions of:

inputting one or more location entities;

computing a one-dimensional grid index series wherein each location entity is represented as a series of grids that incorporate the location of each location entity; and

outputting said grid index series to a database.

2. The computer-implemented process of claim 1 wherein the grid index series is constructed from a number of grid indices overlaid on the same space with grid units of different sizes and wherein the size of each grid is related to the precision of the coordinate values of a database entry.

3. The computer-implemented process of claim 1 wherein a location entity is a point.

4. The computer-implemented process of claim 1 wherein a location entity is an area.

5. The computer-implemented process of claim 4 wherein said area is defined by a center latitude and longitude and a width and a height, each measured from the center latitude and longitude and along lines of latitude and longitude.

6. The computer-implemented process of claim 1 wherein equirectangular projection is used to input latitude and longitude values of said one or more location entities as x-y pairs on a Euclidean coordinate system.

7. The computer-implemented process of claim 1 wherein the process action of computing a grid index series comprises:

gridding the globe at a prescribed number of resolutions;

indexing each grid in raster scan order; and

mapping the latitude and longitude coordinates of each location entity to the index.

8. The computer-implemented process of claim 7 wherein the prescribed number of resolutions is 20.

9. The computer-implemented process of claim 7 wherein the process action of indexing each grid in raster scan order comprises:

for each grid,

determining the longitudinal span, D, in degrees that three standard deviations corresponds to, where a standard deviation σ is the measurement error of a given latitude, longitude coordinate; and

determining the degree-scale of precision, R, to be the discrete unit of resolution just larger than D.

10. The computer-implemented process of claim 9 wherein the longitudinal span in degrees that 3σ meters corresponds to is $d = \frac{[180(3\sigma)\cos(\text{latitude})]}{k\pi}$ is determined, where k is the circumference of the earth in meters.

11. The computer-implemented process of claim 9 wherein the process action of determining the degree-scale of precision, R, to be the discrete unit of resolution just larger than D comprises setting $r = \left| -\log_2 {}^{d}\!/_{20} \right|$.

12. The computer-implemented process of claim 7 wherein the globe is gridded with overlapping grids at each scale in order to increase accuracy.

13. The computer-implemented process of claim 12 wherein coordinates of location entities are mapped to the square whose center is closest.

14. The computer-implemented process of claim 1 wherein the location entity is geographic location data.

15. The computer-implemented process of claim 1 wherein the location entity is described in terms of latitude and longitude.

16. The computer-implemented process of claim 15 wherein the latitude and longitude values are taken as straight x-y pairs on a Euclidean coordinate system.

17. The computer-implemented process of claim 1 wherein the location entity is described in terms of latitude, longitude and altitude.

18. The computer-implemented process of claim 17 wherein the latitude, longitude and altitude values are taken as (x, y, z) coordinate pairs on a Euclidean coordinate system.

19. The computer-implemented process of claim 7 wherein the location entity's coordinates in latitude (lat) and longitude (long) is mapped to the index by $l=\left(\frac{360}{r}\right)\left[\frac{lat+90}{r}\right]+\left[\frac{long+180}{r}\right]$ where r is the degree-scale of precision, and l maps the coordinates to the location entity

20. The computer-implemented process of claim 19 wherein to recover the latitude and longitude values, the latitude (lat) and longitude (long) is calculated as:

$$lat = \frac{lr^2}{360} - 90 + \frac{r}{2},$$

$$long = l\% \frac{r^2}{360} - 180 + \frac{r}{2},$$

where r is the degree-scale of precision, l maps the coordinates to the location entity, and % is the modulus operator.

21. The computer-implemented process of claim 2 wherein the database comprises a location entity identifier and a scale index for one or more scales each corresponding to a different grid.

22. The computer-implemented process of claim 2 wherein a query of the database comprises the following process actions:

querying which location entities are in a given grid cell at a given grid scale;

searching in the data of the given grid scale for the values of the given grid cell; and

returning said values of the given grid cell at the given grid scale.

26. A computer-readable medium having computer-executable instructions for combining a precision estimate of a database entry's coordinate value with the coordinate value into a single index, said computer executable instructions comprising:

inputting one or more location entities;

computing a one-dimensional grid index series wherein each location entity is represented as a series of grids that incorporate the location of each location entity; and

using the grid index series to perform a query of the location entities such that any query that seeks a match of a location entity at a small grid size does not seek a match of a location entity at a larger grid size than said small grid size.

27. The computer-readable medium of claim 26 wherein the instruction computing a grid index series uses an equirectangular projection.

28. The computer-readable medium of claim 26 wherein the series of grids grid the globe at twenty different resolutions, with "square" units whose sides correspond to $20x\left(\frac{1}{2}\right)^r$ degrees, for $0 \leq r \leq 20$.

29. The computer-readable medium of claim 26 wherein the series of grids is a hierarchical series of equilateral polygons embedded within a Platonic solid.

30. The computer-readable medium of claim 26 wherein the series of grids is a hierarchical series of polygons that grids the globe.

EVIDENCE APPENDIX

NONE

RELATED PROCEEDINGS APPENDIX

NONE